SMELT WORKING GROUP
Monday, February 8, 2010

Recommendation for the week of February 8, 2010:

Considering the recent salvage of delta smelt at the CVP on February 3, 6, and 8, current hydrological conditions, and the planned operations of the projects (approximately 11,200 cfs combined exports), the SWG believes that the risk of entrainment for delta smelt is high. The SWG therefore recommends that OMR be set at no more negative than -2000cfs on a 14-day average (no more negative than -2500cfs on a 5-day average), as allowed under Action 2. The Working Group will continue to monitor salvage, survey data, and hydrological conditions and reconvene February 16 to discuss the potential to modify the recommendation.

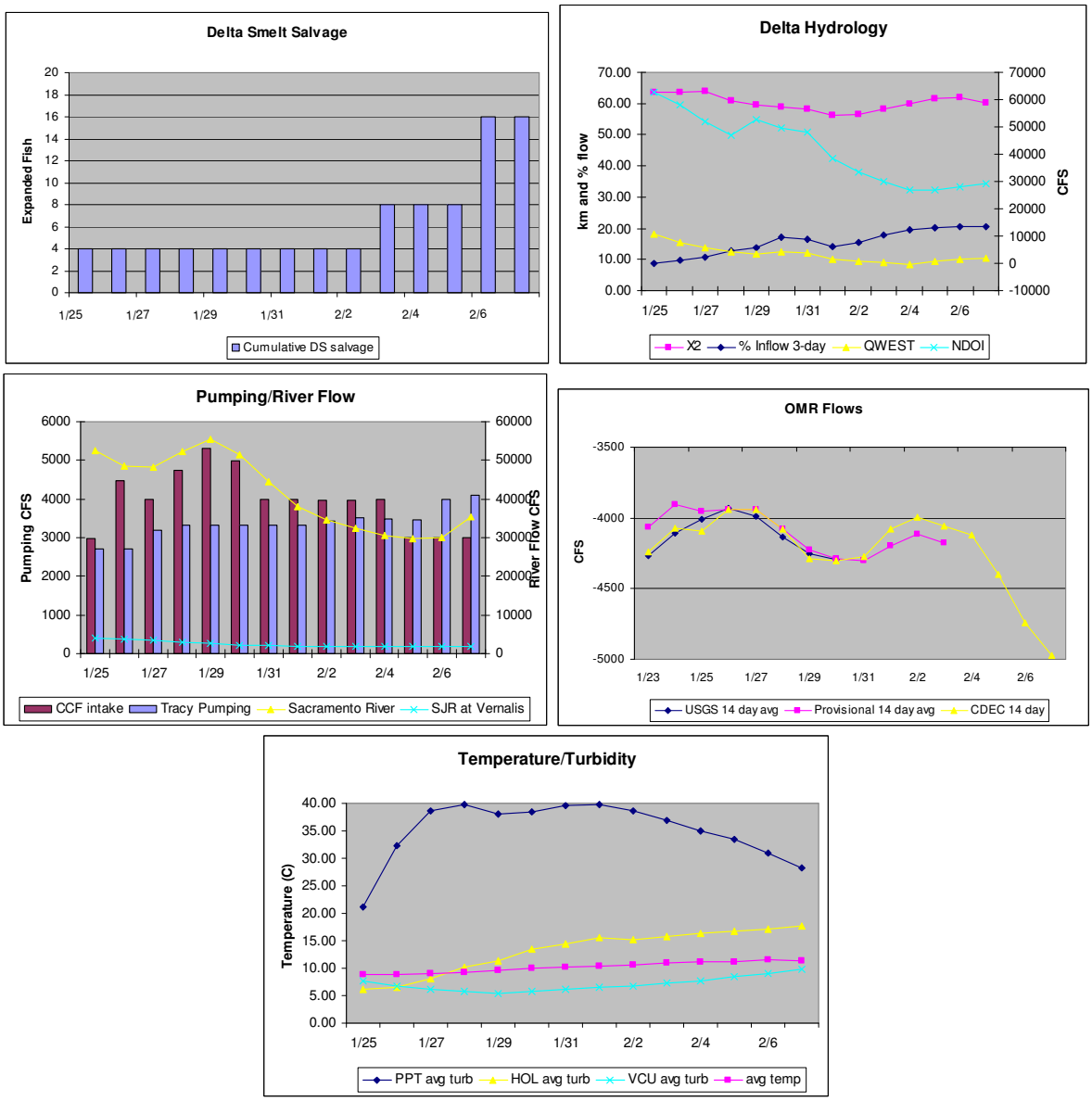
1) Current environmental data.

- **Temperature** for the 3 station average is 11.4 C.

- **Turbidity** is 28.25 NTU for Prisoner's Point, 17.78 NTU for Holland Tract, and 9.76 for Victoria Canal.

- **OMR** The provisional estimate by the projects as of February 3 is -4180 cfs for 14 day average, -5220 cfs for 5 day average. USGS OMR as of January 30 is -4292 cfs 14 day average and -5084 cfs for 5 day average. OMR estimate from CDEC as of February 7 is -4974 cfs 14 day average, -5622 cfs 5 day average.

- **Flow** Sacramento River inflow is about 25,000 cfs and San Joaquin just under 2,000 cfs. The Projects must increase SJR flow to 2280 by the end of the month, and may have to compensate to achieve the needed average. The E/I ratio is about 20%, X_2 is holding at around 60 km, QWEST is positive at about 2100 cfs and NDOI is 29,230 cfs. The Graphs below show the most recent trends in delta smelt cumulative salvage, Delta hydrology, and water quality that were evaluated by the Working Group.



2) Delta fish monitoring:

Smelt Larval Survey #3 was in the field February 1 and 2. No delta smelt larvae were detected. Longfin larvae were collected throughout the Delta and westward, with highest densities in the Sacramento River, confluence and a few stations further west. Lower densities were detected in the central and southern Delta. Spring Kodiak Trawl Survey #2 is in the field this week. Results from larval surveys and the SKT are available online at: http://www.delta.dfg.ca.gov/delta.

3) Salvage

Four delta smelt (expanded) were salvaged on February 3, 8 (expanded) on February 6 and 8 (expanded) as of 8:00 am February 8. The complete count for February 8 will not be available until February 9. A total of 20 delta smelt have been salvaged (expanded) since February 3,

bringing the cumulative total for the season to 24 (expanded). The total allowable take for adults under the Biological Opinion is 123, cumulative, for the season. Thus 24 delta smelt represents approximately 20% of the total for the season.

4) Expected Project Operations

The Projects expect to increase exports to levels allowed under SWRCB Decision 1641. At 4200 cfs, the CVP is at maximum pumping but the SWP expects to increase from 2500 cfs today to 6680 cfs, plus 1/3 of San Joaquin River flow at Vernalis. Total exports are expected to be approximately 11,200 cfs.

5) Particle Tracking Modeling

PTM results based on 31-day scenarios with OMR set at -5000 cfs, -4000 cfs, -3000 cfs, and -2000 cfs were provided by DWR and evaluated by the Working Group. The Group noted that the results of PTM are more applicable to longfin smelt larvae than for the adult delta smelt currently in the Delta. There is no evidence that delta smelt have begun spawning, so the Working Group did not consider the PTM results in the context of delta smelt larval entrainment risk.

6) Discussion for Recommendation

The Working Group reviewed and discussed all relevant data from fish surveys, Delta monitoring, salvage, planned Project operations and particle tracking modeling.

The Working Group unanimously agreed that the first flush has already occurred in the Delta (See notes for February 4). Beyond this, the Working Group was divided on the import of certain elements of the available information. The following discussion reflects the analysis embraced by the majority. References to the "Working Group" therefore refer to the majority opinion and should not be interpreted as a consensus. The minority view is captured separately at the bottom.

Action 2 of the biological opinion, which is intended to protect adult delta smelt after the first flush, includes a range of OMR values from -1250 cfs to -5000 cfs. The BO also provides guidance to assist in the discussion of where to set the OMR value within this range for any given week. The BO (pp 353-354) specifies that if entrainment risk is low, OMR values could be expected to remain as negative as - -5000 cfs, but if entrainment risk is high would be set so as to reduce that risk. The risk factors are (1) evidence of migration, (2) fish occurring in the south or central Delta and (3) evidence of entrainment. Concluding that there is evidence of migration and because salvage has occurred, the majority of the Working Group adopted the high-entrainment risk scenario.

It is the intention of the B.O. to avoid salvage of delta smelt and to minimize salvage when it cannot be avoided. The Group would like to avoid cuing more delta smelt to enter the south Delta (reducing future entrainment events) and to minimize entrainment occurring now to the greatest extent practicable. The majority concluded that the evidence indicates that delta smelt

are actively migrating, which makes them vulnerable to entrainment. The Working Group unanimously expects that the current salvage event will continue over the next week (because the fish observed over the next few days will have already been pulled into Old and/or Middle Rivers). The Group's recommendation to change OMR to no more negative than -2000 cfs is unanimously expected to minimize and potentially avoid future salvage events by avoiding conditions that cue delta smelt in the mainstem of the San Joaquin River to move further south toward the pumps. (But see minority view below: -2000 may not be necessary to achieve this under present circumstances.) The majority views this as a preventative action to keep salvage under the incidental take limit and to reduce the likelihood that additional actions will be needed to protect spawners. Based on the PTM results (0.2% 31-day entrainment at Station 815 at -2000 cfs OMR), the Group unanimously expects that at -2000 cfs OMR the Projects' "footprint" will not extend into the mainstem San Joaquin River. The Group was reminded that in recent years the highest density of adult delta smelt salvage typically occurs over a short period of time (usually over a week or two) prior to March, and that CVP salvage typically precedes SWP salvage. Given these recent historical trends in adult salvage (and the salvage over the past several days), the majority felt that a strong protective action was appropriate this week, to minimize the risks described above.

The Working Group discussed the possibility that at -2000 cfs OMR, some net flow would be moving out of the Old and Middle Rivers further north and west, and that this could assist delta smelt that are just moving into the central Delta to remain in the mainstem San Joaquin River.

The Working Group discussed recommending OMR flows as negative as -5000 cfs. The Working Group observed that salvage had been very low while OMR flows were no more negative than -5000 cfs. Referring to the PTM and considering that adult delta smelt do not behave as particles, the Group noted little difference between -3000 and -4000 cfs OMR; however, there was considerable difference in particle entrainment between -3000 and -5000 cfs OMR. The Group agreed that operating to an OMR flow as negative as -5000 cfs would likely result in a continued high risk of entraining migrating delta smelt. At this more negative end of the OMR flow range, the Group expects that the incidental take limit could be reached prior to the end of the season, and potentially much sooner. The Group could not determine whether there would be a difference in losses to the population with OMR flows at -4000 cfs compared to -5000 cfs. SWG members differed in their opinion on how protective an OMR value of -3000 cfs would be for the species, potentially providing better protection than -4000 cfs OMR at most stations but less protection than -2000 cfs OMR. The PTM results indicate that -2000 cfs OMR limits particle entrainment to Old and Middle Rivers. Members agreed that -2000 cfs provided the best protection for the species at an important time in the species' life history; however, depending upon overall distribution of delta smelt, -3000 or -4000 cfs could be sufficiently protective. Some members suggested that a trigger for salvage should be set, along with an initially more negative OMR flow. The Group decided that they preferred to be proactive, and minimize salvage from this point forward by recommending that OMR be set at the more positive value of -2000 cfs.

After some questioning from the members, operators clarified that once a restriction was placed on OMR flow, they strive to meet the 14-day and 5-day limits each day. For example, if the new limit were placed at -2000 cfs OMR, the operators would strive to meet -2000 cfs OMR each day

of the 14-day window, rather than operating to higher values at the start or the end of the 14 day window. Additionally, the group was reminded that when a new OMR restriction is placed on the operators, the averaging period resets (OMR values from the previous week do not carry forward). This transition language is in draft form.

Alternative (minority) Analysis

The following paragraphs represent the views of a minority of the Smelt Working Group.
A minority of the Working Group view the current salvage as most likely an artifact arising from a sustained spike of high negative OMR occurring after the first flush in mid-January. Under this interpretation, the smelt entrainment occurring now does not indicate that fish are "actively migrating," but represents entrainment from among a body of fish that migrated during the first flush event and is now holding in the Delta. The current salvage event corresponds to an increase in the extent of the entrainment footprint that occurred during a sustained spike in negative OMR that occurred at the beginning of February. The minority notes that OMR during January 1 through January 28th averaged -4181 cfs, with one four-day period (Jan. 16-19) before the first flush spiking to an average of -5550 cfs. There was no entrainment at all in January, even after the first flush presumably brought fish into the lower San Joaquin River and interior Delta. Consequently, it seems likely that maintenance of OMR at a more negative flow than -2000 cfs but within the range experienced in late January will not impose an excessive risk of salvage beyond any additional salvage associated with the current event, which seems inevitable regardless of the choice of OMR.

The minority does not disagree with the general conclusion of the majority that implementation of adult protection action at this time is advisable, only that the actual choice of OMR flow appears more stringent than is really required by the circumstances. Setting the OMR flow to -4000 cfs, as we recommended, offers approximately double the San Joaquin River protection that -5000 cfs would offer (19.1% 31-day Station 815 entrainment vs 36.2% entrainment at -5000 cfs), and provides an entrainment footprint comparable to what existed in late January. A limit of -3000 cfs would cut the risk to 1/6 of the Station 815 entrainment associated with a choice of -5000 cfs, and is something we considered reasonable.

The minority is not convinced that historical circumstances provide a good guide to the level of entrainment risk we may expect in the near future (beyond this week). Winter export pumping has been considerably lower recently than it was in many previous years used for comparison. If early entrainment that occurred in those years due to an expanded early entrainment footprint did not occur this year, then it may not be possible to relax the OMR limitation after this week: a restriction to -4000 cfs or a more positive flow may be required during the remainder of the adult protection period to minimize entrainment of post-migratory adult fish that occupy habitat on the fringes of the entrainment footprint. The Working Group will review new Spring Kodiak Trawl results and additional salvage records with interest as we attempt to sort these risks out.

Next Meeting: Tuesday, February 9, 2010 at 8:30 am

WEEKLY ADVICE FOR THE DEPARTMENT OF FISH AND GAME FOR LONGFIN SMELT

Advice for week of February 1:
The Smelt Working Group believes that OMR no more negative than -5000 cfs (the limit currently in place for salmon) is protective of longfin smelt at this time**.** Sacramento River flows at Rio Vista and San Joaquin River flows at Vernalis did not reach the thresholds to relax OMR restrictions based on longfin smelt larva criteria; however, these flows and Qwest were high enough to transport larvae from the central delta toward Suisun Bay, rather than south.

Basis for advice:
The 2009 State Water Project 2081 for longfin smelt states that advice to the DFG Director shall be based on:

1. Adult Salvage – total adult (>=80mm) longfin smelt expanded salvage (SWP+CVP) for December through February > 5 times the Fall Midwater Trawl longfin smelt annual abundance index.

2. Adult abundance, distribution or other information indicates that OMR flow advice is warranted.

3. Larva distribution in the Smelt Larva Survey or the 20mm Survey finds longfin smelt larvae present at 8 of 12 Central and South Delta sampling stations in 1 survey (809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918, 919).

4. Larva catch per tow exceeds 15 longfin smelt larvae or juveniles in 4 or more of the 12 survey stations listed.

<u>Current Information</u>

No adult longfin smelt were salvaged in the past week and none have been salvaged since the December 1, 2009 criterion period for salvage began. The threshold for the first criterion is a combined expanded salvage exceeding 325 adults occurring during the period December 1 through February 28.

There is no new information on adult distribution. Only a few longfin smelt adults have been collected in the San Joaquin River and farther south in December and January. In December, FMWT caught 2 at Station 810 (north/upstream of False River) and Bay Study got 1 at 837 (Antioch Bridge). In January, Bay Study collected 1 at 864 (near Old River mouth).

Both longfin smelt larva criteria were surpassed during the second Smelt Larva Survey January 19&21. Samples from 29 of 35 stations were processed and posted on the web prior to SWG discussion, including those from all criteria stations. Longfin smelt larvae were detected at 10 of 12 criteria locations and larva catch exceeded 15 at 4 criteria locations. Larvae were detected at almost all sampling stations where samples were processed.

This triggers OMR flow advice unless outflow thresholds are reached (see below). If either larva/juvenile condition triggers advice, advice can restrict OMR flow levels to between -1,250 and -5000 cfs on a 14-day running average and the 5-day running average is within 25 percent of the required OMR flow.

Outflows were approaching thresholds to re-set criteria triggers, but did not reach them last week (see graphics below). OMR restrictions for longfin smelt larvae would not be implemented or would be re-set if net daily Sacramento River flow at Rio Vista surpassed 55,000 cfs or if net daily San Joaquin River flow at Vernalis surpassed 8,000 cfs. As of January 25, the Sacramento River at Rio Vista net flow reached about 48,000 cfs, and began to decline (Figure 1). The San Joaquin River at Vernalis reached a peak of 4,730 cfs on January 23 and began to decline (Figure 2). Also, Qwest became positive on January 21 and surpassed positive 10,000 cfs on January 23 and remained at or above positive 10,000 cfs through January 25 (Figure 3). High Sacramento River flows probably moved all larval longfin smelt from the main channel below Rio Vista. The strong positive Qwest likely transported longfin smelt larvae from the main stem San Joaquin River and the south Delta to Franks Tract to the west toward Suisun Bay. Current OMR negative flows are not particularly strong.

Figure 1. Tidally averaged discharge for Sacramento River at Rio Vista.

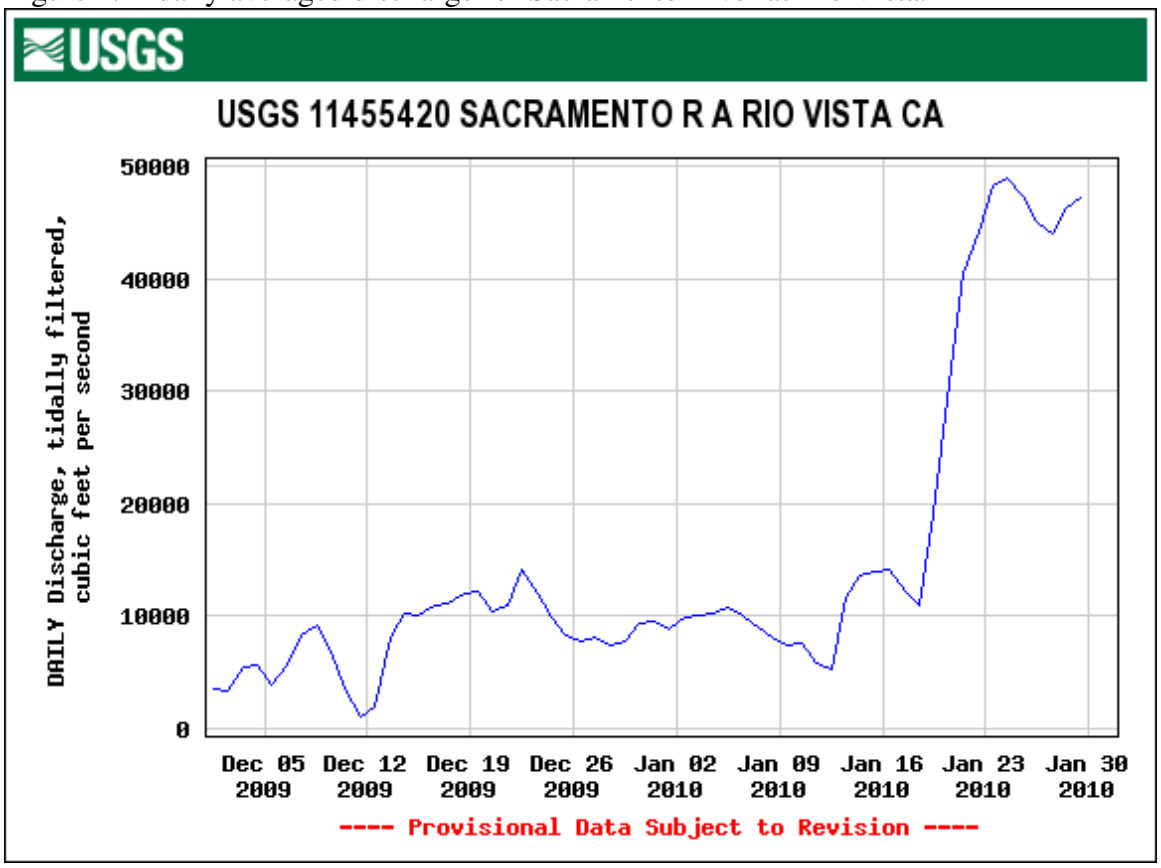


Figure 2. Clifton court intake, Tracy export pumping and daily river flows for the Sacramento River and San Joaquin River at Vernalis.

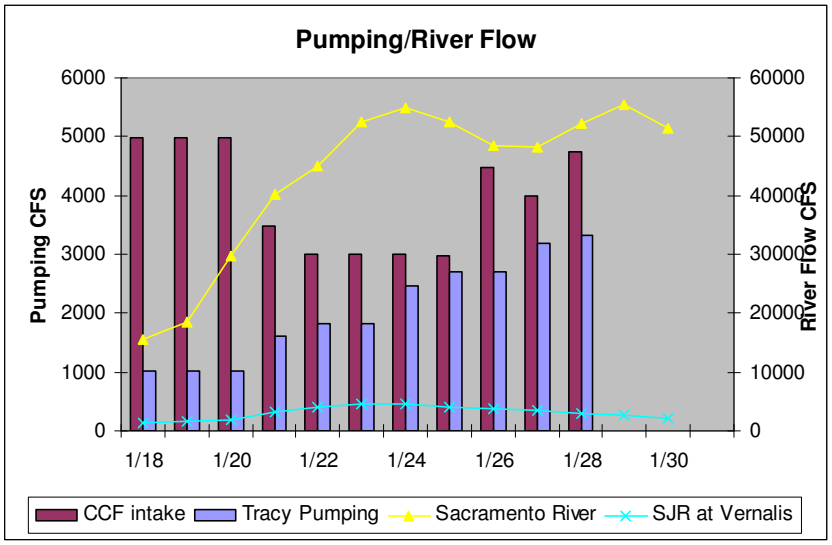


Figure 3. Location of X2 (km), export:inflow ratio (3-day average), Qwest and net delta outflow index all in mean daily form unless identified otherwise.